ESERA 2017 Conference
Dublin City University, Dublin, Ireland.
21st - 25th August 2017

DOES PAIRED MENTORING WORK? A STUDY OF THE EFFECTIVENESS AND AFFECTIVE VALUE OF ACADEMICALLY ASYMMETRICAL PEER MENTORING IN SUPPORTING DISADVANTAGED STUDENTS IN SCHOOL SCIENCE

Rachael Sharpe[1], Ian Abrahams[1], Nikolaos Fotou[2]
[1]School of Education, University of Lincoln, Brayford Pool, Lincoln, United Kingdom.
[2]Maynooth University, Maynooth, Co. Kildare, Ireland.

Within England there has been a growing recognition of the need to increase students' attainment in science especially amongst disadvantaged students whose schools receive additional state funding to support their education. There is, in England, currently no paired mentoring programme in which undergraduates, studying STEM subjects, are paired up with disadvantaged students (aged between 15-16) while they are studying towards their science GCSEs (General Certificate of Secondary Education (public examinations)). This peer mentoring project in which students, from socio-economically disadvantaged backgrounds, are paired with undergraduate students was designed and implemented in order to help improve both their academic achievement in science and their attitudes towards studying science in the post compulsory phase of their education up to, and including, university level. The project is a comparative study involving a control (n=42) and intervention (n=42) group from across four state secondary schools in England. Unlike previous evaluations of mentoring projects, that relied solely upon participants' (mentors, mentees and programme coordinators) self-evaluations, this study uses student school test and public examination data as a measure of academic achievement in addition to questionnaires to investigate their attitudes towards science. This paper reports on the way that this project was designed, issues arising in its implementation, as well as results regarding its effectiveness.

Keywords: paired mentoring, attitudes, summative assessment

INTRODUCTION

Over the last 40 years educators have examined strategies to improve and benefit the learning environment for all students of all backgrounds – and especially those whose background is deemed as disadvantaged. These approaches aim to either improve academic performance or help students develop skills and attitudes. Inherent in much of the literature available on these strategies is an acknowledgement of the multiplicity of the terms used which is indicative of the intended outcome (academic improvement or attitude development) and the relationship between the students and the person who acts as the helper. One of the paired-mentoring programmes outside the USA, which has become a source of inspiration for our project, as well as many other initiatives around the world, is the Perach Project in Israel. The project was established by a handful of students from the Weizmann Institute of Science, who acted as mentors for children of different ages from all sectors of society. Evaluations of the project indicated improvement of students' social skills, academic achievements as well as an increase in their self-confidence and motivation to learn.

RESEARCH QUESTIONS AND METHODOLOGY

This study aimed to investigate whether academically asymmetrical paired mentoring of Year 11 students from disadvantaged backgrounds with undergraduate students studying science subjects could improve those students' academic attainment and attitude towards science. Four secondary schools were approached all with similar socio-demographic character in terms of being matched on their proportion of free school meals, GCSE 5A*- C measures, value-added performance in order to reduce the likelihood of any effect, if

found, being attributable to any factors other than the mentoring project. 86 disadvantaged Year 11 students across the four schools were then were then randomly assigned to the control and experimental groups.

Whilst students in the experimental group were mentored for a total duration of 23 weeks for one hour per week with an intensive six hour mentoring session just prior to their GCSE examination which also provided an opportunity for the Year 11 students to gain an insight into the university environment with a tour of the engineering and science buildings during which they were provided with a talk about the opportunities available for students in HEs. Students in both the experimental and control were also exposed to the same outreach university programmes as well as any in-house school events outside of their normal science GCSE course. Undergraduate mentors all undertook training, provided by staff from the schools, about professionalism as, unlike the Perach Project in which mentors and mentees refer to each other on a first name basis and meet outside of the school framework, in this project mentees referred to their mentors as Miss or Mr and mentors were under strict instructions not to communicate with their Year 11 student in any way outside of the mentoring hour within the school. In addition, each undergraduate was required to undertake Disclosure Barring Checks (DBS) – police checks for past criminal and/or civil convictions. Each undergraduate mentor was randomly allocated to a single Year 11 student with their first meeting taking place during the first timetabled mentoring session in the school under the supervision of the school teachers who would be overseeing the project. Each of the schools had allocated a regular space for the mentor meeting with sufficient space for the pairs to sit and work together at a table on their own. However, it is important to note here that whilst undergraduates were informed of the general arrangements of a mentoring session – i.e. for the sessions to focus solely on science – the actual science content for each meeting was not pre-determined. Indeed, the mentor was able to help their mentee with any particular aspect of the science GCSE curriculum that the mentee felt they needed help with. Teachers of the mentees were also able to pass suggestions of work to be covered in a particular mentoring hour to the supervising school teacher who, in turn, would pass this on to the mentor at the start of the mentoring session. Mentors were asked to share these suggestions with the mentee but only to work on them if the mentee wanted to do so – if the mentee had other science work they preferred to work on then it was the mentee's choice of work that was prioritised. In terms of test data, we collected Year 11 students Key Stage 2 (KS2) Standard Attainment Tests (SATS) which are taken in the final year of primary school at aged 11 and these results are used to predict students' GCSE results – known as target grades. We also collected GCSE mock exam results in January and GCSE final exam results in August. We used this data to compare the results between the control and experimental group to determine whether these 23 weeks of mentoring had any positive impact on improving Year 11 students' achievement in science and students' attitudes to science. In terms of analysis, we used applied bivariate analysis, using t-tests to look at the effects of the mentoring by making comparisons between the achievements of the control and experimental groups of students and by separately comparing the grades that students in each group achieved in KS2 SATS to those they achieved in their mock GCSE exams in January and their final GCSE in August.

RESULTS

Academic attainment: Mock GCSE examination results

Although there was an improvement in both groups' attainment in terms of their mock GCSE examination results when compared to their predicted target grades, that of the students in the mentored group was statistically significantly higher that of the students in the control group suggesting that mentoring had a positive impact on students' achievement in their mock GCSE science examinations.

Academic attainment: GCSE examination results

Although there was an improvement in both groups, the mentored students showed statistically significant improvement in terms of achievement over their control group. Also, on the basis of the comparison of the target grades between the two groups described above (first phase data analysis), these findings suggest that mentoring had a positive impact on students' achievement and that any differences in their achievement had little to do with the students' ability in science.

Findings on Year 11 students' attitudes to science

The evidence suggests that as in three out of the four attitudinal constructs those students who were mentored improved more than those who were not mentored and that this difference was statistically significant. The mentoring programme had a statistically significant positive impact on students' attitudes towards science. The evidence also suggests that whilst there was no positive improvement in mentored students' attitude to self-concept in science mentoring did, compared to those students in the control group, help those students to retain their level of self-concept in science.

CONCLUSIONS AND IMPLICATIONS

The aim of this study was to improve the GCSE examination attainment and attitude to science of disadvantaged Year 11 students by pairing them with undergraduates who would mentor them through the final year of their GCSE science. What has emerged from this RCT study is that the impact of the intervention was statistically significant both in terms of increased academic attainment and in terms of attitude towards science.

Another result that emerged from this study, that is of particular interest in terms of recruiting undergraduates to train to be science teachers, was that six of the 21 undergraduates who were in their third year of study at university have since gone on to train to become secondary science teachers. In post intervention communications with the researchers all six attributed their decision to undertake teacher training directly to their positive mentoring experience as, prior to that experience, none had contemplated a career as a science teacher. In addition, three of the 19 students who were in their second year are now, having commenced their third year of study, considering training to become secondary science teachers and, likewise, attributed this interest in a science teaching career to their mentoring experience. This unexpected positive outcome could demonstrate a new way to encourage science undergraduates to consider undertaking teacher training in science subjects where uptake is currently lower than required (Government, 2015).

For teachers and university lecturers there is a potential exciting challenge of how a similar project could be maintained, potentially through a volunteering approach, to encourage links between school and universities in order to work with a wider body of students rather than only those who are disadvantaged given the current to recruit more scientists (Government, 2015).

REFERENCES

Government (2015) *Tier 2 shortage occupation list: Government-approved version valid from 6 April 2015*. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/423800/shortage_occupation_list_april_2015.pdf (retrieved November 2016).